ECOSYSTEM RESEARCH PROGRAM CHARTER

Program Manager: Leon M. Cammen

1. EXECUTIVE SUMMARY

The National Oceanic and Atmospheric Administration (NOAA) Ecosystem Research Program (ERP) conducts applied research and development to provide the Ecosystem Goal Team and NOAA's stakeholders' scientific information and tools for implementing and evaluating ecosystem management. ERP research priorities are determined by legislative and executive mandates directing NOAA to manage specific marine resources and ecosystems, to develop regional scientific infrastructure, and to support and conduct coastal, marine, and Great Lakes research that will conserve marine resources for future generations.

The ERP's broad-based ecosystem research relies on both internal and extramural programs to focus on the natural and anthropogenic factors that affect coastal, Great Lakes, and marine ecosystems. ERP plays a crucial role in protected species conservation, human health issues relating to the ocean, and habitat conservation and restoration.

A combination of intramural and extramural programs provide ERP the flexibility to direct Program resources to meet annual and longer-term needs identified by the Ecosystem Goal Team and other stakeholders. This flexibility is vital to NOAA's ability to address emerging science issues. More information is available at the ERP website: http://www.oarhq.noaa.gov/erp/.

2. PROGRAM REQUIREMENTS

A. Requirement Drivers:

The Ecosystem Research Program is governed by a series of statutes that require NOAA to provide coastal managers with scientific knowledge, financial assistance, and other support to manage the coastal zone to support society's needs. The following statutes, executive orders, and international agreements are the major Requirements Drivers for the ERP. The complete list of ERP Requirements Drivers, and the specific responsibilities assigned to NOAA, are listed in Appendix A.

- *The President's Oceans Action Plan*
- *National Environmental Policy Act*
- *National Coastal Monitoring Act*
- *National Marine Sanctuaries Act*
- *National Sea Grant College Program Act*
- *Harmful Algal Bloom and Hypoxia Research Control Act*
- *Oceans and Human Health Act*
- *Magnuson-Stevens Fishery Conservation and Management Act*
- *Endangered Species Act*
- *National Contaminated Sediment Assessment and Management Act*
- *National Aquatic Invasive Species Act*
- *Public Health and Welfare – Pollution Prevention and Control Act*
- *Clean Air Act Amendments*

B. Mission Requirements:

Appendix B shows the relationship between ERP Mission Requirements and the Requirements Drivers.

1. Explore and characterize ecosystem health: Sound management of coastal and ocean ecosystems requires scientifically-based information on their health (productivity, function, and condition). Exploration and characterization includes identification of the physical location (ecosystem boundaries), spatial extent, and biological, chemical, and physical characteristics, including the human dimension. NOAA ecosystem characterizations are cornerstones to ecosystem-based management and the basis for many coastal and ocean management tools including forecasts, assessments, and management plans. They also provide the baseline for future assessments of ecosystem condition or change.

2. Identify causes and consequences of changes in ecosystem condition: Ecosystem condition is determined by the interactions between pollution, land and resource use, climate change, invasive species, and extreme events (e.g., storms, disease, and harmful algal blooms). Reducing or mitigating impacts of these stressors requires understanding the ecological and oceanographic processes that govern the structure and function of coastal and ocean ecosystems. With this capability, ERP identifies the stressors affecting ecosystem condition and determines the processes by which they act. As a result, resource managers will have the information they need to balance environmental, social, and economic goals. This capability will also support the research needs of all Ecosystem Goal Team Programs and other ecosystem initiatives important to NOAA.

3. Develop forecasts to predict ecological *(and socioeconomic)* impacts: ERP develops models to support an expanding suite of integrated ecosystem status and health forecasts that provide coastal decision-makers better insight into the consequences of their actions in the context of societal needs and desires. Managers will use NOAA forecasts to understand the impact of ecosystem stressors and to evaluate the potential effects of management actions. These forecasts will be improved with data from the broad network of coastal observing systems being established around the U.S. coasts, including those supported by the Ecosystem Observing Program.

4. Develop technologies and tools: ERP develops the technologies and tools required to increase our understanding of ocean, coastal, and Great Lakes ecosystems, to facilitate the ecosystem-approach to management, and to promote responsible and sustainable use of marine resources. A major output of NOAA ecosystem research is new, or significantly improved technologies and tools that that allow coastal resource managers and coastal constituents to better use, protect, and restore the coastal environment and its resources.

5. Strengthen stewardship through outreach and education: This capability enhances informed decision-making through knowledge transfer and strives to have citizens, educators, resource managers, community leaders and industry routinely use and benefit from ERP products and services. This capability also facilitates the transition

to application of new research, technologies, and tools. This capability includes engagement with coastal communities, stakeholders, and users regarding coastal marine issues.

3. LINKS TO THE NOAA STRATEGIC PLAN

A. **Goal Outcomes:**

- Healthy and productive coastal and marine ecosystems that benefit society.
- A well informed public that acts as a steward of coastal and marine ecosystems.

B. **Goal Performance Objectives:**

- Improve the ecological health within regional coastal and marine ecosystems and assess socio-economic benefits.
- Assess, model, and forecast ecosystem resources for management decisions.
- Increase portion of population that is knowledgeable about coastal and marine ecosystem issues.

C. **Goal Strategies:**

ERP implements the following strategy to achieve its goal outcomes:

- Engage and collaborate with our partners to achieve regional objectives by delineating regional ecosystems, forming regional ecosystem councils, and implementing cooperative strategies to improve regional ecosystem health.
- Manage uses of ecosystems by applying scientifically sound observations, assessments, and research findings to ensure the sustainable use of resources and to balance competing uses of coastal and marine ecosystems.
- Improve resource management by advancing our understanding of ecosystems through better simulation and predictive models. Build and advance the capabilities of an ecological component of the NOAA global environmental observing system to monitor, assess, and predict national and regional ecosystem health, as well as to gather information consistent with established social and economic indicators.
- Develop coordinated regional and national outreach and education efforts to improve public understanding and involvement in stewardship of coastal and marine ecosystems.
- Engage in technological and scientific exchange with our domestic and international partners to protect, restore, and manage marine resources within and beyond the Nation's borders.

4. PROGRAM OUTCOMES

ERP outcomes reflect the program mission and are based on the NOAA 20-Year Research Vision and 5-Year Research Plans:

1. Resource managers use the best available science to make ecosystem-based decisions.
2. A well informed public acts as an effective steward of coastal, marine, and Great Lakes resources.
3. Human health risks decrease as a result of improvements in the condition of coastal, marine, and Great Lakes resources.
4. Resource managers and society benefit from the development, demonstration, and transfer of technology that ensures sustainable use of marine resources.

By providing the scientific foundation to an ecosystem approach to management of coastal and ocean resources, the ERP will enable complex societal choices to be informed by comprehensive and reliable scientific information. Ecosystem research will enhance understanding of physical/chemical/biological interactions and the ability to link ecosystem capacity and models to environmental variability and change. Understanding of multi-species relationships will be advanced, and eventually fully coupled with environmental variability and change. Building on this information, ERP will develop forecasts for a suite of ecological conditions including fisheries, anoxia, harmful algal blooms, beach closings, and water quality.

Once developed, these ecological forecasts will be operationally produced by the Ecosystem Observing and other NOAA programs. ERP research will result in a sound scientific basis for an array of ecosystem indicators with known meaning, an observing system to measure indicators, and models that evaluate tradeoffs between multiple sources of ecosystem stress and type of societal costs and benefits. Improved science-based information will allow us to better manage problems such as variable seafood production, harmful algal blooms, coral reef bleaching events, and ecosystem deterioration by alien and invasive species.

Ocean exploration will increasingly characterize the unknown physical, chemical, biological, and geological aspects of our seas, providing new hypotheses in ecosystem and climate research. Ocean exploration will foster the testing and development of new sensors and platform technologies and will continue to be on the frontier of our understanding of ocean processes and resources.

5. PROGRAM ROLES AND RESPONSIBILITIES

This program is established and managed with the procedures established in the NOAA Business Operations Manual (BOM). Responsibilities of the Program Manager are described in the BOM. Responsibilities of other major participants are summarized below.

The ERP Board of Directors is made up of a senior representative from each of the line offices participating in the ERP and is chaired by the Program Manager who has 51% of the vote concerning all programmatic decisions. The Board provides program oversight and guidance, sets policy, and connects Goal Team and Line Office planning and implementation.

- Program Manager – Leon Cammen
- NOAA Fisheries: Barry Thom
- NOAA Oceans & Coasts: Gary Matlock
- NOAA Research: Barbara Moore

A. Participating Line Office, Staff Office, and Council Responsibilities:

1. NOAA Fisheries Service (NMFS) is responsible for the coordination, administration, and execution of the protected species components of the Ecosystem Research program. This includes budget allocation and execution, tracking of milestones, and completion of protected species research activities. NMFS hosts one of the three NOAA Ocean and

Human Health Centers (in Seattle, WA) and is responsible for reducing human health risks by developing early warning systems to better predict where outbreaks may occur and methods to reduce or eliminate harmful agents from seafood. NMFS is also responsible for maintaining collaborative linkages to other Federal and state agencies, stakeholders, and the public.

2. National Ocean Service (NOS) is responsible for characterizing ecosystem health, identifying the causes and impacts of changes in ecosystem condition, and developing and transferring tools and technologies, including ecological forecasts, that improve ecosystem based management. The NOS conducts and supports research across U.S. coasts, oceans, and Great Lakes, but concentrates its efforts on NOAA protected areas. These include coastal estuaries and estuarine research reserves, National Marine Sanctuaries, coral reef ecosystems, and coastal oceans. As host of one of the three NOAA Center for Ocean and Human Health (in Charleston, SC), NOS is responsible for developing new methods, approaches and tools to evaluate the health responses of marine organisms to multiple stressors, and to identify and characterize chemical and microbial threats to marine ecosystems and human health.

3. NOAA Research (OAR) is responsible for ecosystem exploration and characterization, for identifying causes and impacts of changes in ecosystem condition, and developing and transferring tools and technologies, including ecological forecasts that improve ecosystem based management. Through the Great Lakes Environmental Research Laboratory Ocean and Human Health Center, OAR is responsible for reducing human health risks by developing technology for predicting the formation, location and severity of toxic algal blooms, beach closings and water quality in the Great Lakes basin. OAR also has outreach and education responsibilities to inform coastal and marine decision-making and promote the sustainable use of marine resources.

4. NOAA Research Council provides corporate oversight and develops policy to ensure that NOAA research activities are of the highest scientific quality, meet long-range societal needs, take advantage of emerging scientific and technological opportunities, shape a forward-looking research agenda, and are accomplished in an efficient and cost effective manner. The Research Council is responsible for ensuring that all NOAA services are based on sound science and that all NOAA research programs and long term plans are consistent with the NOAA Mission, NOAA Strategic Plan and recommendations contained in National Research Council and NOAA Science Advisory Board (SAB) research reviews.

5. NOAA Oceans Council is responsible for coordinating ocean activities across NOAA; proposing priorities and investment strategies for ocean-related initiatives; identifying ocean and coastal programs that might benefit most from integration; and coordinating NOAA's participation in the interagency National Oceanographic Partnership Program (NOPP). The NOC is also authorized to develop a strategy and serve as the agency focal point for responding to and implementing the recommendations of the U.S. Commission on Ocean Policy.

6. NOAA Observing Council is responsible for coordinating observational and data management activities across NOAA; proposing priorities and investment strategies for

observation related initiatives; and identifying programs that might benefit most from integration.

7. NOAA Safety Council supports the effective implementation of the NOAA Safety Program and NOAA Safety Policy. It is responsible for reviewing and approving the annual safety action plans and performance measures of ERP's component programs to ensure that these support the NOAA safety program.

8. NOAA General Counsel is responsible for approving grants and interagency agreements.

9. NOAA Education Council is responsible for developing cross-cutting priority goals and projects related to environmental literacy, outreach and education.

10. NOAA Marine and Aviation Operations (NMAO) is responsible for providing ship and aircraft platforms for observing systems during field experiments.

11. Administrative Services is responsible for providing administrative support for grants.

12. NOAA Facilities is responsible for providing a safe and productive work environment.

13. IT Services is responsible for providing the general IT services required by the program.

B. External Agency/Organization Responsibilities

1. Environmental Protection Agency (EPA)**:** ERP and EPA's Office's of Wetlands, Oceans and Watersheds and Policy, Economics and Innovation work together to enhance community development and Smart Growth education and training opportunities to local decision-makers. ERP and EPA's Great Lakes National Program Office work cooperatively to improve understanding that leads to improved ecosystem management of the Great Lakes.

2. National Science Foundation (NSF): ERP and NSF increase collaboration and communications among ocean scientists, educators and the general public through the cooperatively run Centers for Ocean Science Education Excellence (COSEE). The seven COSEE centers facilitate the integration of research into high quality educational activities, programs and materials in order to engage students and their teachers, and develop their interest into a mature understanding of the relevance of the oceans to their lives. ERP and NSF also partner to administer competitive extramural research programs (i.e. the South Florida Ecosystem Restoration Study, the Harmful Algal Bloom and Hypoxia Research and Control Act).

3. Federal Task Forces**:** The ERP actively participates in the Coral Reef Task Force, Aquatic Nuisance Species Task Force, Gulf of Mexico Hypoxia Task Force, Great Lakes Interagency Task Force, and the South Florida Ecosystem Restoration Task Force. Task Force interaction facilitates coordination with Federal, State, tribal, academic, and industry partners and informs ERP problem identification, planning, and implementation.

4. National Aeronautics Space Administration (NASA)**:** ERP and NASA's Space Grant and USDA's Cooperative State Research Education and Extension Service share goals related to improved environmental decision-making, and cooperatively fund a geospatial specialist to provide NASA geospatial information to coastal community development specialists. ERP and NASA also share goals in exploration and partner on the use of NOAA's underwater laboratory, *Aquarius* as a space station analog supporting astronaut training and development of technologies for remote applications in the sea and in space.

5. Universities and Colleges**:** ERP relies on partnerships with universities to augment NOAA's internal programs. The National Sea Grant Program, the National Undersea Research Program, the National Centers for Coastal Ocean Science, and OAR Research Laboratories' Cooperative Institutes provide long term institutional arrangements that support research as well as infrastructure and expertise to ensure that both federal and non-federal personnel have access to advanced underwater technologies and extension and outreach resources. The following examples illustrate the variety in ERP-university partnerships:

- The Sea Grant Law Center disseminates information about marine laws and policies, coordinates ocean and coastal law researchers, and provides the ERP and its constituents a source of critical analysis of marine laws and policies.
- ERP administers the NOAA Environmental Cooperative Science Center (ECSC) in collaboration with Florida A&M University, Delaware State University, Jackson State University, Morgan State University, South Carolina State University, and the University of Miami. ECSC was established in 2001 to (1) increase the number of underrepresented minorities in atmospheric, environmental, and oceanic sciences by training students and expanding the capacity of faculty from member institutions to participate in NOAA related research; (2) develop tools, including conceptual models, to assess the response of coastal ecosystems and communities to perturbation and develop measurement programs to monitor critical system attributes; (3) improve the scientific basis for coastal resource management; and (4) facilitate community education and outreach relating to the function and significance of coastal ecosystems.
- The three NOAA Ocean and Human Health Centers (in Seattle, WA; Charleston, SC; and Ann Arbor, MI) are built on partnerships with the federal, state, academic and nonprofit communities. For example, the Medical University of South Carolina and the University of Charleston are partners in the Hollings Marine Laboratory, a multi institutional, multi-disciplinary institution developing science and biotechnology applications to sustain, protect, and restore coastal ecosystems, emphasizing linkages between environmental and human health.
- Cooperative institutes leverage ERP personnel, funding, and equipment and broaden the Program's expertise. Cooperative institutes with a primary emphasis on ecosystem research include: Cooperative Institute for Limnology and Ecosystems Research (CILER) at the University of Michigan and Michigan State University,

Cooperative Institute for Climate and Ocean Research (CICOR) at the Woods Hole Oceanographic Institution, Joint Institute for Marine Observations (JIMO) at the Scripps Institute of Oceanography and the University of California, San Diego, Joint Institute for Marine and Atmospheric Research (JIMAR) at the University of Hawaii and The Cooperative Institute for Marine and Atmospheric Studies (CIMAS) at the University of Miami.

- The University of Mississippi and University of Southern Mississippi are partners in NIUST (National Undersea Technology Institute), a multi-institutional, multi-disciplinary institute developing advanced technologies to support undersea research and biotechnologies using marine natural products.

6. END USERS OR BENEFICIARIES OF PROGRAM

ERP has two categories of user groups - those who use the end products of research, and those who are recipients of financial awards. ERP validates the effectiveness of its products and services with the end users through surveys, consultation, and external reviews.

1. NOAA**:** The ERP provides NOAA the scientific information and tools necessary to address its science and management mandates, including implementing and evaluating ecosystem management. It is the responsibility of the ERP to meet the research requirements of the Ecosystem Goal, and it is working with each of the Goal Team Programs (Coastal and Marine Resources Program, Coral Program, Fisheries Management Program, Ecosystem Observation Program, Aquaculture Program, Protected Species Management Program, Habitat Program, Enforcement) to identify, address, and evaluate the Program's success in meeting those requirements.

2. Coastal Managers**:** The ERP provides timely, sound, and relevant science to support coastal management decisions by managers in Federal (including NOAA), state, tribal, and international governments and agencies. For example, ERP characterizations have informed protected area boundaries and sea grass damage recovery models that are routinely used to set reparations in ship grounding cases.

3. Stakeholders**:** Environmental groups, recreational and commercial industry groups, and the public with an interest in what ERP does and how ERP decides which research to conduct. Segments of these groups routinely use ERP products and services to inform ocean and coastal management decisions and to assess the impacts and effectiveness of those decisions.

4. Research Community**:** Once operational, the ecosystem characterizations, models, and forecasts developed by ERP are used by the research community to design and implement monitoring and research programs. For example, harmful algal bloom and hypoxia forecasts are used to redirect water quality monitoring.

APPENDIX A: REQUIREMENTS DRIVERS

The Ecosystem Research Program is governed by a series of statutes, executive orders, and international agreements defining the national oceans policy. The statutes require NOAA to provide coastal managers with scientific knowledge, financial assistance, and other support to manage the coastal zone to support society's needs. This Appendix lists those statutes and mandates.

National Environmental Policy Act (42 USC 4321 et seq.)

- Directs NOAA to "prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man."
- Requires NOAA to "enrich the understanding of the ecological systems and natural resources important to the Nation."

National Coastal Monitoring Act, Title V of the Marine Protection, Research, and Sanctuaries Act, (33 U.S.C. 2801-2805):

- Requires NOAA and EPA to develop and implement a program for the long-term collection, assimilation, and analysis of scientific data designed to measure the environmental quality of the nation's coastal ecosystems.
- NOAA and the EPA shall jointly to submit to Congress a report, every other year, on the condition of the nation's coastal ecosystems.

National Marine Sanctuaries Act (16 U.S.C. § 1431)

- NOAA shall support, promote, and coordinate scientific research on, and long-term monitoring of, the resources of these marine areas, and evaluate the implementation of each sanctuary's management plan and goals.
- Mandates NOAA to "prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man."

National Sea Grant College Program Act

- Directs NOAA to support "national strategic investments in fields relating to ocean, coastal, and Great Lakes resources."
- Funds a national network of 30 Sea Grant state programs, each of which is required to maintain "a program of research … in fields related to ocean, coastal, and Great Lakes resources."

Outer Continental Shelf Lands Act of 1978 (43 U.S.C. §1347)

- The Secretary of Commerce shall conduct studies of underwater diving techniques and equipment, and improvement in diver performance. NOAA's Undersea Research Program and the NOAA Diving Program maintain this activity on behalf of the Secretary.

Harmful Algal Bloom and Hypoxia Research Control Act (16 U.S.C. § 1451):

- NOAA shall develop research plans and assessments and examine alternatives to reduce, mitigate, and control hypoxia and harmful algal blooms i*n coastal waters including the* Great Lakes.
- NOAA shall support a comprehensive effort to examine the causes and ecological and economic consequences of Harmful Algal Blooms (HABs) and hypoxia, and to describe the potential ecological and economic costs and benefits of policy and management actions to prevent, reduce, and control HABs and hypoxia.
- NOAA shall assessment HABs and hypoxia not less than once every 5 years.

Oceans and Human Health Act:

- The Secretary of Commerce is required to establish an Oceans and Human Health Initiative to coordinate and implement research and activities of the National Oceanic and Atmospheric Administration related to the role of the oceans in human health.
- NOAA shall provide support for (1) program and research coordination; (2) an advisory panel; (3) one or more National Oceanic and Atmospheric Administration national centers of excellence; (4) research grants; and (5) distinguished scholars and traineeships.

Magnuson-Stevens Fishery Conservation and Management Act:

- NOAA must eliminate over-fishing and balance social, economic, and environmental needs using the best available science.

Endangered Species Act:

- NOAA shall manage to prevent the extinction of endangered and threatened marine species.

Marine Mammal Protection Act:

- NOAA shall to protect all marine mammal species and their habitats.

Coral Reef Conservation Act (16 U.S.C. §§ 6401-6409):

- NOAA should map, monitor, assess, restore, and conduct scientific research of coral reefs.

Coastal Zone Management Act and Coastal Zone Act Reauthorization Amendments of 1990:

- NOAA must to encourage states to preserve, protect, develop and, where possible, restore and enhance valuable natural coastal resources.

The President's Oceans Action Plan:

- NOAA should use the "best science and data to inform our decision-making" in order to "advance the next generation of ocean, coastal and Great Lakes policy."

US Commission on Ocean Policy Report Recommendations 25-2 to 25-4:

- NOAA should move toward an ecosystem-based management approach.
- NOAA should produce cutting edge ocean data and science translated into high-quality information for managers.
- NOAA should promote lifelong ocean-related education to create well-informed citizens with a strong stewardship ethic.
- NOAA should develop a coordinated national research effort to better understand the links between the oceans and human health.

Coast and Geodetic Survey Act of 1947 (33 USC § 883a-i):

- NOAA shall conduct and sponsor applied research to improve surveying and cartographic methods, instruments, and equipments and assure the future availability and usefulness of ocean satellite data to the maritime community.
- NOAA shall conduct investigations and research in geophysical sciences.

Ocean Dumping Act, Title II of the MPRSA, (33 U.S.C. § 1401-1445):

- NOAA shall to initiate and conduct a comprehensive and continuing program of research with respect to the possible long-range effects of pollution, as well as monitoring programs to assess the health of the marine environment.

National Contaminated Sediment Assessment and Management Act (33 U.S.C. § 1271):

- NOAA, with the EPA and Department of the Army, shall conduct a comprehensive and continuing program to assess aquatic sediment quality, including the extent of pollutants in sediments and areas where pollutants in sediment pose a threat to fisheries resources and marine habitats.

Water Pollution Prevention and Control Act (33 USC§ 1268):

- NOAA shall conduct, through the *Great Lakes Environmental Research Laboratory*, the National Sea Grant College program, other Federal laboratories, and the private sector, appropriate research and monitoring activities which address priority issues and current needs relating to the Great Lakes.
- NOAA shall identify issues relating to the Great Lakes resources on which research is needed. The Research Office shall submit a report to Congress on such issues before the end of each fiscal year which shall identify any changes in the Great Lakes system with respect to such issues.
- NOAA and other parties to the Great Lakes Water Quality Agreement of 1978 – Amended 1987, should determine the mass transfer of pollutants between the Great Lakes basin ecosystem components and the processes controlling the transfer of pollutants; develop load reduction models for pollutants; determine cause-effect inter-relationships of productivity and ecotoxicity; determine the impact of water quality and the introduction of non-native species on fish and wildlife population and habitats; and develop approaches to population-based studies to determine the long-term, low-level effects of toxic substances on human health.

Regional Marine Research Program Act (16 USC §1447B):

- NOAA should establish regional research programs to set priorities for regional marine and coastal research in support of efforts to safeguard the water quality and ecosystem health of each region.
- NOAA shall carry out research through grants and improved coordination.

Commerce and Trade Act (15 USC §1511 sec 2901):

- The Secretary of Commerce is responsible for the conception, planning, and conduct of basic research and development in the fields of water motion, water characteristics, water quantity, and ice and snow.
- NOAA shall publish data and the results of research projects in forms useful to the Corps of Engineers and the public.
- NOAA shall operate a Regional Data Center for the collection, coordination, analysis, and the furnishing to interested agencies of data relating to water resources of the Great Lakes.

Executive Order 13113 Invasive Species:

- NOAA shall detect and respond rapidly to control populations of invasive species, conduct research on invasive species, and develop technologies to prevent introduction and provide environmentally sound control of invasive species.

Aquatic Nuisance Species (16 USC § 4741):

- As a Task Force Member, NOAA shall conduct research concerning possible methods for the prevention, monitoring and control of aquatic nuisance species.

National Aquatic Invasive Species Act of 2003 (sec 301, 401):

- NOAA, as part of the National Invasive Species Council, is responsible for developing a set of sampling protocols, a geographic plan, and a budget to support a national system of ecological surveys for rapid detection of aquatic invasive species.

Study of Migratory Game Fish, Waters, Research Purpose (16 U.S.C. § 760e):

- NOAA shall undertake a comprehensive continuing study of migratory marine fish of interest to recreational fishermen of the United States, including fish which migrate through or spend part of their lives in the inshore waters of the United

States. The study shall include, but not be limited to, research on migrations, identity of stocks, growth rates, mortality rates, variation in survival, environmental influences, both natural and artificial, including pollution and effects of fishing on the species for the purpose of developing wise conservation policies and constructive management activities.

Public Health and Welfare – Pollution Prevention and Control (42 U.S.C. § 7412):

- NOAA shall conduct a program to identify and assess the extent of atmospheric deposition of hazardous air pollutants to the Great Lakes, the Chesapeake Bay, Lake Champlain and coastal waters.
- NOAA shall monitor, investigate the sources and deposition rates of atmospheric deposition of air pollutants (and their atmospheric transformation precursors), and conduct research to develop and improve monitoring methods and to determine the relative contribution of atmospheric pollutants to total pollution loadings to the Great Lakes, the Chesapeake Bay, Lake Champlain, and coastal waters.

Clean Air Act Amendments of 1990 (Title III):

- NOAA shall identify and assess the extent of atmospheric deposition of air pollutants to the Great Lakes, the Chesapeake Bay, Lake Champlain and coastal waters. Specifically, NOAA shall: 1) monitor; 2) investigate the sources and deposition rates of atmospheric deposition of air pollutants; 3) develop and improve monitoring methods and determine the relative contribution of atmospheric pollutants to total pollution loadings; 4) evaluate adverse effects to public health or the environment caused by deposition and assess the contribution of deposition to violations of water quality standards; and 5) sample for pollutants in biota, fish, and wildlife of the Great Lakes, the Chesapeake Bay, Lake Champlain and coastal waters and characterize the sources of such pollutants.
- NOAA shall biennially submit to the Congress a report on the results of the above monitoring, studies, and investigations, and a description of any revisions of the requirements, standards, and limitations pursuant to this Act and other applicable Federal laws as are necessary to assure protection of human health and the environment.
- NOAA shall determine whether the provisions of the Clean Air Act Amendment of 1990 are adequate to prevent serious adverse effects to public health and serious or widespread environmental effects.

Clean Air Act Amendments of 1990 (Title IX):

- NOAA shall improve understanding of the short-term and long-term causes, effects, and trends of ecosystems damage from air pollutants on ecosystems, by: 1) identifying regionally representative and critical ecosystems for research; 2) evaluating risks to ecosystems exposed to air pollutants; 3) developing improved atmospheric dispersion models and monitoring systems; 4) evaluating the effects of air pollution on water quality, forests, materials, crops, biological diversity, soils, and other terrestrial and aquatic systems exposed to air pollutants; and 6) Estimation of the associated economic costs of ecological damage which have occurred as a result of exposure to air pollutants.

National Materials and Minerals Policy Research and Development Act (30USC 1601 et seq):

- NOAA shall conduct fundamental ocean research and discovery focused on gaining an understanding of the impacts of hydrothermal vents on virtually all major components of the global ocean environment.

- NOAA shall maintain ongoing in situ biological, physical, and chemical time-series observations in and around representative active submarine volcanic and hydrothermal regions, coupled with remote monitoring using acoustic technology.

Coastal Ocean Program, § 201(c) of Public Law 102-56:

- Authorizes a Coastal Ocean Program and directs NOAA to augment and integrate NOAA existing programs and include efforts to improve predictions of fish stocks, to better conserve and manage living marine resources.

Coastal Wetlands Planning, Protection, and Restoration Act:

- NOAA shall conduct and support coastal wetlands restoration and conservation projects, with particular emphasis on the state of Louisiana.

Executive Order 13158 regarding Marine Protected Areas (2000):

- NOAA shall protect the significant natural and cultural resources within the marine environment for the benefit of present and future generations by strengthening and expanding the Nation's system of marine protected areas (MPAs).
- NOAA is required to develop a scientifically based, comprehensive national system of MPAs representing diverse U.S. marine ecosystems, and the Nation's natural and cultural resources.

Government Performance and Results Act:

- NOAA is required to develop and implement an accountability system based on performance measurement, including setting goals and objectives and measuring progress toward achieving them.
- The ecosystem site characterizations ERP conducts are used to establish baselines, assess ecosystem status and trends, and evaluate management effectiveness by measuring change in status.

Lacy Act Amendments of 1981:

- NOAA shall conduct marine forensic research to support its enforcement mission including best techniques to allow identification of stock, species or taxon from a variety of fresh, decomposed, cooked, or preserved tissues or specimens (marine forensics) for trade or impact of human activities management.

OMB Circular A-16 (Coordination of Geographic Information and Related Spatial Data Activities):

- NOAA is required to improve management decisions in the coastal environment by providing access to the long-term coastal data record to support monitoring, prediction, and analyses; to help in the formulation of public policy; to facilitate ecosystem approach to management.
- NOAA shall create a unified long-term database of coastal and marine datasets.

Oil Pollution Act:

- NOAA shall assess damages for the natural resources under their trusteeship.
- NOAA is required to develop and implement a plan for the restoration, rehabilitation, replacement, or acquisition of the equivalent of, the natural resources under their trusteeship.

Water Resources Development Act of 1992:

- NOAA shall conduct a comprehensive national survey of data regarding aquatic sediment quality in the United States.

United Nations Fish Stocks Agreement:

- NOAA is responsible for managing species and habitats that cross jurisdictional boundaries through activities such as: strengthening scientific research capacity in

the field of fisheries and promoting scientific research related to the conservation and management of straddling fish stocks and highly migratory fish stocks for the benefit of all.

Great Lakes Water Quality Agreement of 1978—Amended 1987:

- Commits the U.S. to restore and maintain the chemical, physical and biological integrity of the Great Lakes Basin Ecosystem.
- Establishes the Great Lakes Water Quality Board and the Great Lakes Science Advisory Board; NOAA participants in both boards.

NOAA Strategic Plan, FY 2005 – FY 2010 (46a):

- Directs NOAA to manage uses of ecosystems by applying scientifically sound observations, assessments, and research findings to ensure the sustainable use of resources and to balance competing uses of coastal and marine ecosystems.

APPENDIX B: ERP REQUIREMENTS DRIVERS AND MISSION REQUIREMENTS

ERP Mission Requirements are based on the statues, executive orders, and mandates listed in the Requirement Drivers column. This table shows how the Program's drivers map to the requirements.

REQUIREMENT DRIVERS	MISSION REQUIREMENTS				
	Explore & Characterize	Identify Causes & Consequences	Develop Forecasts	Develop Technologies & Tools	Strength Stewardship
National Environmental Policy Act (42 USC 4321 et seq.)	X	X	X		
National Coastal Monitoring Act, Title V of the Marine Protection, Research, and Sanctuaries Act, (33 U.S.C. 2801-2805)	X	X		X	X
National Marine Sanctuaries Act (16 U.S.C. § 1431)	X	X	X	X	
National Sea Grant College Program Act	X	X	X	X	X
Outer Continental Shelf Lands Act of 1978 (43 U.S.C. §1347)	X			X	
Harmful Algal Bloom and Hypoxia Research Control Act (16 U.S.C. § 1451)	X	X	X	X	
Oceans and Human Health Act	X	X	X	X	X
Magnuson-Stevens Fishery Conservation and Management Act	X	X	X	X	
Endangered Species Act	X	X	X	X	X
Marine Mammal Protection Act	X	X	X	X	X
Coral Reef Conservation Act (16 U.S.C. §§ 6401-6409):	X	X	X	X	X
Coastal Zone Management Act and Coastal Zone Act Reauthorization Amendments of 1990		X	X	X	X

The President's Oceans Action Plan	X	X	X	X	X
US Commission on Ocean Policy Report Recommendations 25-2 to 25-4	X	X	X	X	X
Coast and Geodetic Survey Act of 1947 (33 USC § 883a-i)	X	X		X	X
Ocean Dumping Act, Title II of the MPRSA, (33 U.S.C. § 1401-1445)	X	X	X	X	
National Contaminated Sediment Assessment and Management Act (33 U.S.C. § 1271)	X				
Water Pollution Prevention and Control Act (33 USC§ 1268)	X	X	X	X	X
Regional Marine Research Program Act (16 USC §1447B)	X	X	X	X	
Commerce and Trade Act (15 USC §1511 sec 2901)	X	X		X	X
Executive Order 13113 Invasive Species	X	X	X	X	X
South Florida Ecosystem Restoration Task Force	X	X	X		
Aquatic Nuisance Species Program (16 USC §4722 sec d, f, 1c)	X	X		X	X
National Aquatic Invasive Species Act of 2003 (sec 301, 401)	X				
Study of Migratory Game Fish, Waters, Research Purpose (16 U.S.C. § 760e)	X	X	X		
Public Health and Welfare – Pollution Prevention and Control (42 U.S.C. § 7412)	X	X	X	X	
Executive Order 13340, Great Lakes Task Force	X	X	X	X	
Clean Air Act Amendments of 1990 (Titles 3 and 9)	X	X	X	X	
National Materials and Minerals Policy Research and Development Act (30USC 1601 et seq)	X	X		X	X
Coastal Ocean Program, § 201(c) of Public Law 102-567		X	X		
Coastal Wetlands Planning, Protection, and Restoration Act				X	
Comprehensive Environmental Response, Compensation, and Liability Act		X	X	X	
Estuary Restoration Act	X	X	X	X	X
Executive Order 13158 regarding Marine Protected Areas (2000)	X	X	X		

Government Performance and Results Act	X			X	
Lacey Act Amendments of 1981	X	X		X	
OMB Circular A-16 (Coordination of Geographic Information and Related Spatial Data Activities)	X	X	X		
Oil Pollution Act	X	X	X	X	
Water Resources Development Act of 1992	X				
Great Lakes Water Quality Agreement of 1978—Amended 1987	X	X	X	X	X
National Aquaculture Act(1980 and revised 1985)	X	X	X	X	X
NOAA Strategic Plan, FY 2005 – FY 2010	X	X	X	X	X
United Nations Fish Stock Agreement	X	X			X